nels of an access channel slot. It should be noted that the reference bit/synch inserter **112** will need to be modified in the alternative embodiment to insert one reference bit for every three data symbols. This chip rate after spreading preferably is the same as the preferred embodiment (i.e., 1.2288 Megachips/second). It will be appreciated by those skilled in the art that each subchannel may have reference coded access channel transmissions originating from different transmission sources such that the effective number of available RACCH can be doubled.

Thus, a communication system for coherently encoding and decoding has been described above with reference to FIG. **1**. The preferred embodiment operations of the communication system may be summarized with reference to FIGS. **3** and **4** which show flowcharts of the transmitting and receiving processes, respectively.

In the transmitting process **200–210** shown in FIG. **3**, reference symbols are inserted **202** into a stream of access channel message data symbols to form a reference coded stream of access channel message data symbols. The reference coded stream of access channel message data symbols are appended **204** onto the end of a synchronization message to form a reference coded access channel transmission. Subsequently, the reference coded access channel are prepared **206** transmission for transmission over a communication channel by spreading the reference coded access channel transmission with a spreading code to form a spread reference coded access channel transmission prior to transmission over the communication channel. These spreading operations of the preparing step **206** preferably are substantially similar to spreading operations of another preparing step utilized in communicating over a traffic communication channel of the communication system. Also, the preparing step **206** preferably uses a higher degree Walsh code (e.g., a 128 bit length Walsh code) as the spreading code to partition an access channel slot into at least two subchannels in which different reference coded access channel transmissions can be communicated. These Walsh codes (e.g., 128 bit length Walsh codes) preferably are selected such that they are orthogonal to the remaining 63 other 64 bit length Walsh codes of a Hadamard matrix. Finally, the spread reference coded access channel transmission is transmitted **208** over the communication channel.

In the transmitting process **212–228** shown in FIG. **4**, a communication signal is received **214** over a communication channel. A known synchronization sequence is correlated **216** with the received communication signal to detect a correlation peak and when this occurs a synchronization message is present in the received communication signal. In addition, an initial channel response is determined **218** from the correlation peak. Further, the received communication signal is despread **220** with a spreading code to derive a stream of reference samples and a stream of data samples when the correlation peak is generated. The initial channel response is revised **222** based on an estimated channel response derived from the stream of reference samples to form a modified channel response estimate. Subsequently, an estimated data symbol is generated **224** from the stream of data samples by utilizing the modified channel response estimate. These detecting operations of the despreading **220**, revising **222**, and generating **224** steps preferably are substantially similar to detecting operations utilized in communicating over a traffic communication channel of the communication system. Provided that these detection operation are similar, the modified channel response estimate preferably is stored **226** for subsequent use in detecting operations performed on the traffic communication channel. As needed, the despreading step **220** preferably uses a higher degree Walsh code (e.g., a 128 bit length Walsh code) as the spreading code to differentiate between at least two subchannels of an access channel slot. Each subchannel may have reference coded access channel transmissions originating from different transmission sources. These Walsh codes (e.g., 128 bit length Walsh codes) preferably are selected such that they are orthogonal to the remaining 63 other 64 bit length Walsh codes of a Hadamard matrix.

Although the invention has been described and illustrated with a certain degree of particularity, it is understood that the present disclosure of embodiments has been made by way of example only and that numerous changes in the arrangement and combination of parts as well as steps may be resorted to by those skilled in the art without departing from the spirit and scope of the invention as claimed. For example, the modulator, antennas and demodulator portions of the preferred embodiment communication system as described were directed to CDMA spread-spectrum signals transmitted over a radio communication channel. However, as will be understood by those skilled in the art, the encoding and decoding techniques described and claimed herein can also be adapted for use in other types of transmission systems like those based on time division multiple access (TDMA) and frequency division multiple access (FDMA). In addition, the communication channel could alternatively be an electronic data bus, wireline, optical fiber link, satellite link, or any other type of communication channel. Furthermore, other channels of a communication system may be modified like the RACCH to be similar to the traffic channel so that the advantages of using similar components and coherent detection techniques can be extended to those other channels.

What is claimed is:

1. A communication unit for use in a communication system comprising:

(a) reference means for inserting reference symbols into a stream of access channel message data symbols to form a reference coded stream of access channel message data symbols;

(b) synch insertion means, operatively coupled to the reference means, for appending the reference coded stream of access channel message data symbols onto the end of a synchronization message to form a reference coded access channel transmission; and

(c) spreading means, operatively coupled to the synch insertion means, for preparing the reference coded access channel transmission for transmission over a communication channel by spreading the reference coded access channel transmission with a spreading code to form a spread reference coded access channel transmission prior to transmission over the communication channel.

2. The communication unit of claim **1** wherein the spreading means is substantially similar to a spreading mechanism utilized in communicating over a traffic communication channel of the communication system.

3. The communication unit of claim **1** wherein the spreading means comprises means for using a Walsh code as the spreading code to partition an access channel slot into at least two subchannels in which different reference coded access channel transmissions can be communicated.

4. The communication unit of claim **3** wherein the spreading means comprises means for using two distinct 128 bit length Walsh codes as the spreading code to partition the access channel slot into two subchannels, the two 128 bit length Walsh codes being orthogonal to the remaining 63 other 64 bit length Walsh codes of a Hadamard matrix.